



## Huntington Power Plant

6 miles west of Huntington, Utah on Hwy. 31  
P.O. Box 680  
Huntington, Utah 84528

December 21, 2017

Mr. Bryce Bird, Director  
Utah Department of Environmental Quality  
Division of Air Quality  
195 North 1950 West  
P.O. Box 144820  
Salt Lake City, UT 84114-4820

**RE: 4th Quarter, 2017 Particulate Matter Compliance Test Report - 40 CFR 63 SubPart UUUU,  
Huntington Power Plant Unit 1 and Unit 2 (Title V Permit #1501001004)**

Dear Mr. Bird,

In accordance with Title V Permit Condition II.B.3.f.1(b) and 40 CFR §63.10021(d) the Huntington Power Plant submits the 4th Quarter 2017 Particulate Matter (PM) Compliance Test Reports for Unit 1 and for Unit 2.

This submittal is intended to satisfy the report submittals for both units, and includes the portable document format (PDF) report that is submitted electronically via the Emissions Collection and Monitoring Plan System (ECMPS).

The summary results of the 4th Quarter 2017 PM test results are:

Unit	Emission rate (lb/mmBtu)
1	0.011
2	0.005

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information, or omitting statements and information, including the possibility of fine or imprisonment.

Should you have any questions regarding this information, please contact Richard Neilson, Huntington Power Plant Environmental Engineer at (435) 687-4334 or me at (435) 687-4211.

Sincerely,

Darrell Cunningham  
Managing Director and Responsible Official, Huntington Plant

Enclosures: "Emissions Testing Report for PacifiCorp Huntington Unit 1 – Particulate Matter Compliance Testing"  
"Emissions Testing Report for PacifiCorp Huntington Unit 2 – Particulate Matter Compliance Testing"

cc: David Barnhisel  
Steve Jensen  
Sara Loiacono, USEPA Region VIII, w/enclosures, by electronic communication



Emissions Testing Report for PacifiCorp  
Huntington Unit 1  
Huntington, Utah

Particulate Matter Compliance Testing

40 CFR Part 63, Subpart UUUUU

Test Date: December 5, 2017

Project Code PC17-0001.20

## **Executive Summary**

EMCo was contracted by PacifiCorp to conduct compliance testing at the Huntington Power Plant near Huntington, Utah. Testing was performed to determine emission rates of particulate matter (PM) from the exhaust stack of Huntington Unit 1. Compliance test results are summarized in the table below; detailed test results are given in the following report.

<b>PaciCorp</b> <b>Huntington Power Plant</b> <b>PM Compliance Test Results Summary</b>						
<b>Source</b>	<b>Parameter</b>	<b>Date</b>	<b>Average Value</b>	<b>Emission Limit</b>		
Huntington Unit 1	Filterable Particulate Matter	12/5/2017	0.011	0.030 lb/mmBtu		
			0.12	0.30 lb/MW-hr		
Each result is the average of three two-hour test runs.						
<b>Abbreviations:</b> lb/mmBtu: pounds per million British thermal units lb/MW-hr: pounds per megawatt hour						

## **Introduction**

EMCo was contracted by PacifiCorp to conduct source testing services at the Huntington Power Plant near Huntington, Utah. The Huntington Plant comprises two pulverized coal-fired boilers. Huntington Unit #1 is equipped with low-NO<sub>x</sub> burners and overfire air for nitrogen oxides (NO<sub>x</sub>) control, a flue gas desulfurization (FGD) scrubber for sulfur dioxide (SO<sub>2</sub>) control and pulse-jet fabric filters for particulate matter (PM) control. Testing was conducted in accordance with the requirements of 40 CFR Part 63 Subpart UUUUU, National Emission Standards for Hazardous Air Pollutants (NESHAP): Coal- and Oil-Fired Electric Utility Steam Generating Units.

Contact information for the project is listed in the table below.

Contact	Affiliation	Telephone	E-mail
Frank Zampedri Environmental Analyst	PacifiCorp	(801) 220-2169	frank.zampedri@pacificorp.com
Richard Neilson Environmental Engineer		(435) 687-4334	richard.neilson@pacificorp.com
Rob Leishman Environmental Scientist	UDEQ	(801) 536-4063	rleishman@utah.gov
Andrew Bruning Client Project Manager	EMCo	(303) 495-3936	abruning@montrose-env.com

## **Scope of Work**

Testing was performed to determine concentrations and mass emission rates of particulate matter (PM) for comparison to the applicable emission limits listed in the table below.

Source	Regulation	Parameter	Emission Limit
Huntington Unit 1	NESHAP UUUUU	PM (lb/mmBtu)	0.030 lb/mmBtu
		PM (lb/MW-hr)	0.30 lb/MW-hr
<b>Abbreviations:</b> lb/mmBtu: pounds per million British thermal units lb/MW-hr: pounds per megawatt-hour			

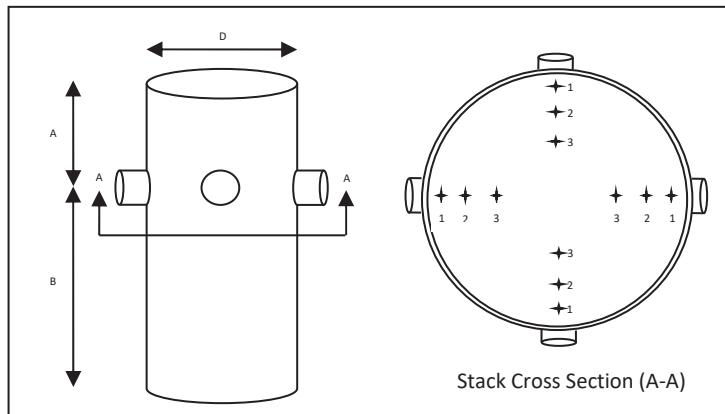
## **Testing Methods**

EMCo used the following EPA Reference Methods for the testing program. No deviations from the Reference Methods were noted.

Parameter	EPA Reference Methods	Test Runs/Duration	Target Sample Volume
PM (lb/mmBtu)	1, 2, 3B, 4, 5*, 19	3 @ 2 hr	2 dscm (70.63 dscf)**
*In accordance with Table 5 of NESHAP Subpart UUUUU, the front-half temperature was set at 320° ± 25°F.			
**Sample volume from Table 2 of NESHAP Subpart UUUUU, doubled in accordance with §63.10005.			

### Testing Location

The Huntington Unit #1 exhaust sampling location consists of a vertical, circular stack with four orthogonal sampling ports located at least six diameters downstream and two diameters upstream of the nearest flow disturbances. PM testing was performed across a grid of 12 points determined using EPA Method 1. See the schematic below.



Huntington Test Diagram	
Unit #	1
Diameter (D)	323.3"
Upstream Distance (A)	>220'
Downstream Distance (B)	>266'
<b>Sample Point Distances from Stack Wall</b>	
Traverse Point 1	14.1"
Traverse Point 2	47.3"
Traverse Point 3	95.7"

### Test Results

The results of the testing program are given in the tables below. Detailed test results are located in Appendix A, along with sample calculations for all computed values.

PacificCorp Huntington Unit 1 PM Compliance Test Results Summary (12/5/2017)						
Parameter	Run #1	Run #2	Run #3	Average	QA Specification	Emission Limit***
Start Time	7:04	10:01	13:52	—	—	—
Stop Time	9:19	13:16	16:04	—	—	—
Sample Gas Volume (dscf)	73.86	73.10	74.81	<b>73.92</b>	<b>&gt;70.63*</b>	—
Isokinetic Variation (%)	95.0	95.8	96.8	<b>95.9</b>	<b>100 ± 10%</b>	—
Filterable PM (lb/mmBtu)	0.011	0.011	0.011	<b>0.011</b>	—	<b>0.030</b>
Boiler Load (MW)	482	482	482	<b>482</b>	<b>&gt;468**</b>	—
Filterable PM (lb/MW-hr)	0.12	0.12	0.11	<b>0.12</b>	—	<b>0.30</b>

\* Sample volume from Table 2 of NESHAP Subpart UUUUUU, doubled in accordance with §63.10005.  
\*\*90% of design capacity, in accordance with §63.10007(a)(2).  
\*\*\*As shown, average PM emissions were less than 50% of the applicable emission limit, qualifying the unit for Low Emitting EGU (LEE) status.

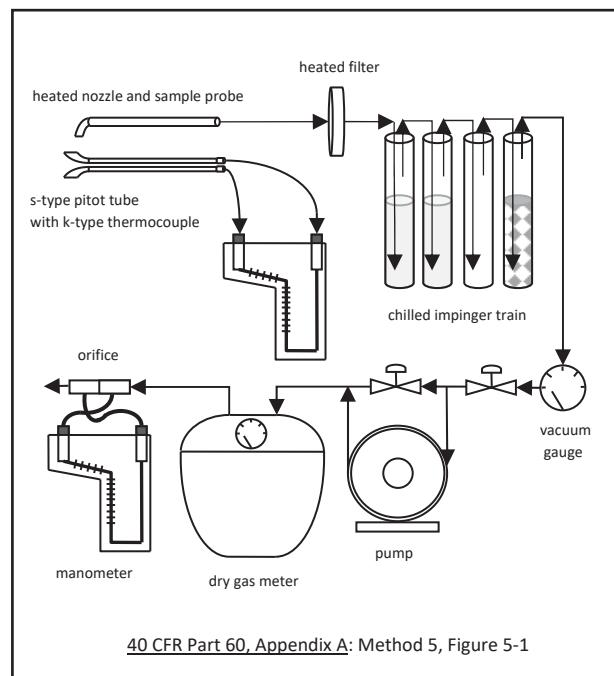
## **Testing Equipment**

All testing equipment was housed in a climate-controlled mobile analytical laboratory designed and built by EMCo. All required quality assurance tests were performed as required by the applicable Reference Methods. Detailed equipment descriptions are given in the table below.

Parameter	Equipment	EPA Reference Method(s)
Particulate Matter (PM)	Heated probe with glass nozzle and stainless steel probe liner Quartz fiber filter S-type pitot tube K-type thermocouple Inclined-vertical manometer Dry gas meter Digital scale Analytical balance	1, 2, 3B, 4, 5, 19

## **Test Details**

Particulate matter testing was performed using EPA Methods 1, 2, 3B, 4 and 5. Each test run was 120 minutes in duration. Sampling was performed along a grid of points determined using EPA Method 1. Exhaust gas flow measurements were taken using an S-type pitot tube, K-type thermocouple and inclined-vertical manometer in accordance with EPA Method 2. A sample of exhaust gas was withdrawn from the stack at an isokinetic flow rate through a heated stainless steel nozzle and probe, through a heated quartz-fiber filter, through four chilled glass impingers containing known masses of water or silica gel, and through a dry gas meter. (See Figure 5-1 at right.) The default dry molecular weight for combustion sources (30 lbs/lb-mole) listed in EPA Method 3 was combined with pressure and temperature measurements to calculate stack gas velocity in accordance with EPA Method 2. Stack gas moisture concentrations were determined gravimetrically in accordance with EPA Method 4. Following each sampling period, the filter and rinses of the nozzle and probe were recovered and returned to EMCo's laboratory for gravimetric analysis. Following analysis, the particulate mass captured during each test run was combined with concurrent flow and moisture data to calculate particulate matter emissions in units of pounds per hour (lb/hr). The particulate mass captured during each test run was combined with concurrent CO<sub>2</sub> concentration data from the plant CEMS<sup>1</sup> and the appropriate fuel F-factor from EPA Method 19 (1,800 scf/mmBtu) to calculate PM emissions in units of pounds per million British thermal units (lb/mmBtu) for comparison to the applicable emission limit.



<sup>1</sup> EPA Method 3B §6.0 states "As an alternative to the sampling apparatus and systems described herein, other sampling systems may be used, provided such systems are ... capable of yielding acceptable results." As NESHAP UUUUUU requires certified Part 75 CEMS CO<sub>2</sub> data to calculate SO<sub>2</sub> and mercury emissions in units of lb/mmBtu, CEMS CO<sub>2</sub> data are considered acceptable for PM emission calculations as well.

## **Appended Information**

Supporting data for this testing program are included as follows.

### **Appendix A: Test Summary**

- Data Reduction Spreadsheet
- Sample Calculations

### **Appendix B: Field Data**

- Field Datasheets

### **Appendix C: Laboratory Data**

- Gravimetric Analysis

### **Appendix D: CEMS Data**

- Test Run CEMS Printouts

### **Appendix E: Calibration Information**

- Dry Gas Meter Pre-Test and Post-Test Calibrations
- Critical Orifice Calibration Certificate
- AETB Certification



**Project PC17-0001**

**Appendix A: Test Summary**

Data Reduction Spreadsheets

Sample Calculations

PC17-1.20  
 PacifiCorp  
 Huntington Unit 1  
 12/5/2017

	Run #	1	2	3	
Θ	Start Time	7:04	10:01	13:52	
	Stop Time	9:19	13:16	16:04	
	Sample Time (min.)	120	120	120	
EPA Method 2 Data		1	2	3	Average
<b>Inputs</b>					
D <sub>s</sub>	Stack Diameter (inches)	323.3	323.3	323.3	<b>323.3</b>
P <sub>bar</sub>	Barometric Pressure ("Hg)	23.92	23.8	23.8	<b>23.8</b>
P <sub>g</sub>	Stack Static Pressure ("H <sub>2</sub> O)	-2.2	-2.2	-2.2	<b>-2.2</b>
C <sub>p</sub>	Pitot Tube Coefficient (unitless)	0.84	0.84	0.84	<b>0.84</b>
VΔp <sub>avg</sub>	Avg. Velocity Head of Stack Gas v("H <sub>2</sub> O)	0.8387	0.8322	0.8434	<b>0.8381</b>
T <sub>s</sub>	Stack Gas Temperature (°F)	108	109	111	<b>109</b>
<b>Calculations</b>					
A	Stack Area (ft <sup>2</sup> )	570.084	570.084	570.084	<b>570.084</b>
P <sub>g</sub>	Stack Static Pressure ("Hg)	-0.16	-0.16	-0.16	<b>-0.16</b>
M <sub>d</sub>	Stack Gas Molecular Weight, dry basis (lb/lb-mole)	30.00	30.00	30.00	<b>30.00</b>
M <sub>s</sub>	Stack Gas Molecular Weight, wet basis (lb/lb-mole)	28.81	28.72	28.72	<b>28.75</b>
P <sub>s</sub>	Absolute Stack Pressure ("Hg)	23.76	23.64	23.64	<b>23.68</b>
T <sub>s(abs)</sub>	Absolute Stack Gas Temperature (°R)	568	569	571	<b>569</b>
V <sub>s</sub>	Stack Gas Velocity (ft/sec)	54.9	54.7	55.5	<b>55.0</b>
Q	Stack Gas Dry Volumetric Flow Rate (dscf/hr)	74,885,599	73,534,300	74,403,810	<b>74,274,570</b>
Q	Stack Gas Dry Volumetric Flow Rate (dscf/min)	1,248,093	1,225,572	1,240,064	<b>1,237,909</b>
CEMS Diluent Data		1	2	3	Average
<b>CO<sub>2</sub> (%vvw)</b>					
		10.9	10.9	10.8	<b>10.9</b>
<b>CO<sub>2</sub> (%vvd)</b>					
		12.1	12.2	12.1	<b>12.1</b>
EPA Method 4 Data		1	2	3	Average
<b>Inputs</b>					
V <sub>lc</sub>	Volume of Water Condensed (mL)	172.4	196.6	189.6	<b>186.2</b>
V <sub>m</sub>	Volume of Stack Gas Collected (dscf)	88.25	88.441	91.577	<b>89.423</b>
Y	Meter Calibration Factor (unitless)	0.9988	0.9988	0.9988	<b>0.9988</b>
ΔH	Pressure Differential Across Orifice ("H <sub>2</sub> O)	1.6	1.7	1.7	<b>1.7</b>
T <sub>m</sub>	Temperature at Gas Meter (°F)	46	50	56	<b>51</b>
<b>Calculations</b>					
P <sub>m</sub>	Absolute Pressure at Gas Meter ("Hg)	24.04	23.93	23.93	<b>23.96</b>
T <sub>m</sub>	Absolute Temperature at Gas Meter (°R)	506	510	516	<b>510.7</b>
V <sub>wc(std)</sub>	Volume of Water Condensed (scf)	8.11	9.25	8.92	<b>8.76</b>
V <sub>m(std)</sub>	Sample Gas Volume (dscf)	73.86	73.10	74.81	<b>73.92</b>
B <sub>ws act</sub>	Observed Stack Gas Moisture Content (%/100)	0.099	0.112	0.107	<b>0.106</b>
B <sub>ws sat</sub>	Saturated Moisture Content (%/100)	0.103	0.107	0.113	<b>0.108</b>
B <sub>ws</sub>	Moisture Content Used (%/100)	0.099	0.107	0.107	<b>0.104</b>
EPA Method 5 Data		1	2	3	Average
<b>Inputs</b>					
D <sub>n</sub>	Nozzle diameter (")	0.233	0.233	0.233	<b>0.233</b>
C1	Mass of PM collected on filter (mg)	6.2	5.7	6.3	<b>6.1</b>
C2	Mass of PM collected in rinses (mg)	19.5	19.6	18.0	<b>19.0</b>
W <sub>a</sub>	Mass of acetone blank (mg)	0.0	0.0	0.0	<b>0.0</b>
<b>Emission Calculations</b>					
F <sub>c</sub>	Fuel F-Factor (scf/mmBtu)	1800	1800	1800	<b>1800</b>
A <sub>n</sub>	Cross-sectional area of nozzle (ft <sup>2</sup> )	2.96E-04	2.96E-04	2.96E-04	<b>2.96E-04</b>
I	Isokinetic variation (%)	95.0	95.8	96.8	<b>95.9</b>
m <sub>n</sub>	Total Filterable PM mass less blank (mg)	25.7	25.3	24.3	<b>25.1</b>
C <sub>s</sub>	Filterable Particulate concentration (gr/dscf)	0.005	0.005	0.005	<b>0.005</b>
C <sub>s</sub>	Filterable Particulate concentration (lb/dscf)	7.67E-07	7.63E-07	7.16E-07	<b>7.49E-07</b>
E <sub>lb/hr</sub>	Filterable Particulate mass emission rate (lb/hr)	57	56	53	<b>56</b>
	Boiler Load (MW)	482	482	482	<b>482</b>
	Filterable Particulate mass emission rate (lb/MW-hr)	0.12	0.12	0.11	<b>0.12</b>
F <sub>c</sub>	Filterable Particulate mass emission rate (lb/mmBtu)	0.011	0.011	0.011	<b>0.011</b>
8760 hrs/yr	Filterable Particulate mass emission rate (tons/year)	252	246	233	<b>244</b>

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

Variables

Variable	Value	Definition	Unit of Measurement
D <sub>s</sub>	323.3	Stack Diameter	inches
A	570.08	Cross-Sectional Area of the Stack	ft <sup>2</sup>
P <sub>g</sub>	-2.20	Stack Static Pressure	in. H <sub>2</sub> O
P <sub>g</sub>	-0.16	Stack Static Pressure	in. Hg
%CO <sub>2</sub>	12.1	Concentration of Carbon Dioxide	Dry Volume Percent (%vd)
%O <sub>2</sub>	n/a	Concentration of Oxygen	Dry Volume Percent (%vd)
M <sub>d</sub>	30.00	Dry Molecular Weight of the Stack Gas (default)	lb/lb-mole
P <sub>bar</sub>	23.92	Barometric Pressure	in. Hg
ΔH	1.60	Pressure Differential across Orifice	in. H <sub>2</sub> O
P <sub>m</sub>	24.04	Absolute Pressure at Gas Meter	in.Hg
t <sub>m</sub>	46	Temperature at Gas Meter	°F
T <sub>m</sub>	506	Absolute Temperature at Gas Meter	°R
K1	0.04706	Conversion Factor	ft <sup>3</sup> /mL
V <sub>lc</sub>	172.4	Volume of Water Condensed	g
V <sub>wc(std)</sub>	8.11	Volume of Water Condensed	scf
K <sub>4</sub>	17.64	Constant	°R/in.Hg
Y	0.9988	Meter Calibration Factor	Unitless
V <sub>m</sub>	88.25	Volume of Stack Gas Collected	dcf
V <sub>m(std)</sub>	73.864	Sample Gas Volume	dsfc
B <sub>ws</sub>	0.099	Stack Gas Moisture Content	%/100
M <sub>s</sub>	28.81	Actual Molecular Weight of the Stack Gas	lb/lb-mole
P <sub>s</sub>	23.76	Absolute Stack Pressure	in. Hg
T <sub>s</sub>	108	Average Stack Temperature	°F
T <sub>s(abs)</sub>	568	Average Absolute Stack Temperature	°R
K <sub>p</sub>	85.49	Conversion Factor	(ft/sec) x V(((lb/lb-mole)(in.Hg))/((°R)(in.H <sub>2</sub> O)))
C <sub>p</sub>	0.84	Pitot Coefficient	Dimensionless
AvgvΔp	0.8387	Average Square Root of Velocity Head Readings	in. H <sub>2</sub> O
V <sub>s</sub>	54.86	Average Stack Gas Velocity	ft/sec
T <sub>std</sub>	528	Standard Absolute Temperature	°R
P <sub>std</sub>	29.92	Standard Absolute Pressure	in. Hg
Q	74,885,599	Dry Volumetric Flow Rate Corrected to Standard Conditions	dsfc/hr
D <sub>n</sub>	0.233	Nozzle Diameter	inches
A <sub>n</sub>	2.96E-04	Cross-Sectional Area of the Nozzle	ft <sup>2</sup>
m <sub>n</sub>	25.70	Total PM Mass	mg
C <sub>s</sub>	7.67E-07	Particulate Concentration	lb/dsfc
E <sub>lb/hr</sub>	57.4	PM Mass Emission Rate	pounds per hour
F <sub>c</sub>	1800	F-Factor from EPA Method 19	scf/mmBtu
E <sub>lb/mmBtu</sub>	0.011	PM Mass Emission Rate	pounds per million Btu
E <sub>tons/yr</sub>	251.6	PM Mass Emission Rate	tons per year
K5	0.0945	Constant	(in.Hg · min) / (°R · sec)
Θ	120	Sample Time	minutes
I	95.0 %	Isokinetic variation	percent

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

$$A = \pi(D_s/24)^2$$

$$\pi(323.3/24)^2$$

$$= 570.08 \text{ ft}^2$$

$$P_g = P_{bar}/13.6$$

$$= -2.2/13.6$$

$$= -0.16 \text{ in. Hg}$$

$$M_d = 30.00 \text{ lb/lb-mole}$$

$$P_m = P_{bar} + (\Delta H/13.6)$$

$$= 23.92 + (1.6/13.6)$$

$$= 24.04 \text{ in. Hg}$$

$$T_m = 460 + t_m$$

$$= 460 + 46$$

$$= 506 \text{ R}$$

$$V_{wc(std)} = K_1 \times V_{lc}$$

$$= 0.04706 \times 172.4$$

$$= 8.11 \text{ scf} \quad (Eq. 4-1)$$

$$V_{m(std)} = \frac{K_4 \times Y \times V_m \times P_m}{T_m}$$

$$= \frac{17.64 \times 0.9988 \times 88.25 \times 24.04}{506}$$

$$= 73.86 \text{ dscf} \quad (Eq. 4-3)$$

$$B_{ws} = \frac{V_{wc(std)}}{V_{wc(std)} + V_{m(std)}}$$

$$= \frac{8.11}{8.11 + 73.86}$$

$$= 0.099 (\%/100) \quad (Eq. 4-4)$$

$$M_s = M_d \times (1 - B_{ws}) + (18.0 \times B_{ws})$$

$$= 30.00 \times (1 - 0.099) + (18.0 \times 0.099)$$

$$= 28.81 \text{ lb/lb-mole} \quad (Eq. 2-6)$$

$$P_s = P_{bar} + P_g$$

$$= 23.92 + (-0.16)$$

$$= 23.76 \text{ in. Hg}$$

$$T_{s(abs)} = 460 + T_s$$

$$= 460 + 108$$

$$= 568 \text{ R}$$

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

$$V_s = K_p \times C_p \times Avgv/\Delta p \times \sqrt{\frac{T_{s(abs)}}{(P_s \times M_s)}}$$

$$= 85.49 \times 0.84 \times 0.8387 \times \sqrt{\frac{568}{(23.76 \times 28.81)}}$$

$$= 54.9 \text{ ft/sec}$$

(Eq. 2-7)

$$Q = 3600 \times (1 - B_{ws}) \times (V_s) \times (A) \times \frac{(T_{std} \times P_s)}{(T_{s(abs)} \times P_{std})}$$

$$= 3600 \times (1 - 0.099) \times (54.86) \times (570.08) \times \frac{(528 \times 23.76)}{(568 \times 29.92)}$$

$$= 74,885,599 \text{ dscf/hr}$$

(Eq. 2-8)

$$A_n = \pi(D_n/24)^2$$

$$\pi(0.233/24)^2$$

$$= 2.96E-04 \text{ ft}^2$$

$$C_s = \frac{m_n}{(mg/g)(g/lb)(V_{m(std)})}$$

$$= \frac{25.7}{(1000)(453.592)(73.864)}$$

$$= 7.67E-07 \text{ lb/dscf}$$

$$E_{lb/hr} = C_s \times Q$$

$$= 7.67E-07 \times 74885599$$

$$= 57.4 \text{ lb/hr}$$

$$E_{lb/mmBtu} = \frac{C_s \times F_c \times 100}{(CO_2\%vd)}$$

$$= \frac{7.67E-07 \times 1800 \times 100}{(12.1)}$$

$$= 0.011 \text{ lb/mmBtu}$$

$$E_{tons/yr} = \frac{E_{lb/hr} \times (\text{Hrs/yr})}{(\text{lbs/ton})}$$

$$= \frac{57.44 \times 8,760}{2000}$$

$$= 251.6 \text{ tons/year}$$

$$I = \frac{K5 \times T_{s(abs)} \times V_{m(std)} \times 100}{P_{s(abs)} \times V_s \times A_n \times \Theta \times (1 - B_{ws})}$$

$$= \frac{0.0945 \times 568 \times 73.864 \times 100}{23.76 \times 54.86 \times 3.0E-04 \times 120 \times (1 - 0.099)}$$

$$= 95.0 \%$$

(Eq. 5-7)



**Project PC17-0001**  
**Appendix B: Field Data**  
Field Datasheets

## Emissions Measurement Company: Method 5/202 Data Sheet

EMCo Job #:	045AS-284160	Operator(s): <u>AB</u> SS
Client:	Pacificorp	Barometric pressure ("Hg): 23.92
Source:	Huntington UI	Static pressure ("H <sub>2</sub> O): -2.2
Date:	12-5-17	Leak Check ("H <sub>2</sub> O @ Vac): 0.00@13"
Run #	1	Leak Check ("H <sub>2</sub> O @ Vac): 0.00@ 13"
Meterbox ID:	MS-2	Pitot ID / Coeff: 1.84
Meterbox Y = .9988 ΔH@ =	1,772	Pitot Leak Check: ✓
O <sub>2</sub> %:	6.8	Nozzle Diameter: .233
CO <sub>2</sub> %:	11.7	K Factor: 2.3
Start Time	0704	Stop Time 919

Impinger Weights (x.x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total		
		Total

**Emissions Measurement Company: Method 5/202 Data Sheet**

EMCo Job #:	045AS-294160	Operator(s):	A.B SS
Client:	Pacificorp	Barometric pressure ("Hg):	23.92 23.80
Source:	Huntington U1	Static pressure ("H <sub>2</sub> O):	-2.2
Date:	12-5-17	Leak Check ("H <sub>2</sub> O @ Vac):	0.07 @ 15"
Run #	2	Leak Check ("H <sub>2</sub> O @ Vac):	0.07 @ 17"
Meterbox ID:	M5-2	Pitot ID / Coeff:	.84
Meterbox Y = .9988 ΔH@= 1.772		Pitot Leak Check:	✓
O <sub>2</sub> %:	6.8	Nozzle Diameter:	.233
CO <sub>2</sub> %:	11.7	K Factor:	2.75 2.4
Start Time	1001	Stop Time	1316

Impinger Weights (x.x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total		
	Total	

Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity Δp (in H <sub>2</sub> O)	Orifice Pressure ΔH (in H <sub>2</sub> O)	Vacuum (in Hg)	Sample Volume (ft <sup>3</sup> )	DGM Temp (°F)		CPM Filter Temp (°F)	Imp. Outlet Temp (°F)
									Inlet	Outlet		
								560.454				
1-1	16	189	313	314	.60	1.4	5	567.2	44	43	68	36
2	20	108	314	320	-7.5	1.7	6	595.0	50	43	68	36
3	30	108	312	318	.75	1.8	7	582.346	55	44	72	42
2-1	40	105	313	317	.60	1.4	6	589.4	54	45	70	43
2	50	109	310	320	.77	1.9	7	597.174	55	45	72	44
3	60	110	317	319	.75	1.8	7	606.560	47	46	64	38
3-1	70	110	318	319	.63	1.5	6	613.0	52	46	71	48
2	80	110	320	320	.72	1.7	7	620.9	55	47	76	49
3	90	110	317	318	.72	1.7	7	628.004	57	48	80	50
4-1	100	116	319	320	.59	1.4	6	635.0	57	49	78	48
2	110	111	318	320	.70	1.7	7	642.5	59	50	81	48
3	120	110	320	319	.75	1.8	7	650.273	60	51	83	56
								89.779				
								-1.338				
12	120	(109)	316	314	(8322)	(1.7)	7	(88.441)	(50)	24	50	

# Emissions Measurement Company: Method 5/202 Data Sheet

EMCo Job #:	045-284160	Operator(s):	RB
Client:	PL	Barometric pressure ("Hg):	23.80
Source:	HTG u1	Static pressure ("H <sub>2</sub> O):	-2-2
Date:	12/15/17	Leak Check ("H <sub>2</sub> O @ Vac):	0.00, @ 15"
Run #	3	Leak Check ("H <sub>2</sub> O @ Vac):	0.00 @ 11"
Meterbox ID:	M5-2	Pitot ID / Coeff:	.84
Meterbox Y = .9988 ΔH@ = 1.772		Pitot Leak Check:	✓
O <sub>2</sub> %:	~6.5	Nozzle Diameter:	.233
CO <sub>2</sub> %:	~21.15	K Factor:	2.4
Start Time	1352	Stop Time	1604

Impinger Weights (x.x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total		
		Total

Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity Δp (in H <sub>2</sub> O)	Orifice Pressure ΔH (in H <sub>2</sub> O)	Vacuum (in Hg)	Sample Volume (ft <sup>3</sup> )	DGM Temp (°F)		CPM Filter Temp (°F)	Imp. Outlet Temp (°F)
									Inlet	Outlet		
① 1	10	109	311	314	.61	1.5	8	657.023				
2	20	111	319	317	.75	1.8	10	655.7	56	50	66	38
3	30	111	319	317	.75	1.9	11	673.411	58	57	72	41
② 1	40	110	320	319	.64	1.5	10	680.9	54	54	74	43
2	50	111	316	320	.71	1.7	10	688.3	59	52	79	45
3	60	111	319	320	.75	1.8	11	696.121	60	53	78	45
③ 1	70	110	319	320	.66	1.6	10	703.5	59	53	78	44
2	80	111	319	320	.75	1.8	11	711.4	61	54	81	44
3	90	111	317	321	.75	1.8	11	719.139	62	55	80	46
④ 1	100	111	315	319	.64	1.5	10	726.3	60	55	80	47
2	100	111	316	319	.77	1.9	12	734.9	63	56	83	46
3	120	111	318	319	.77	1.9	12	742.600	63	50	81	48
12	120	(111)	311	314	1.9434	1.7	12	91.577	(56)	77	48	

# EMCO

THE U.S. DRY MEASUREMENT COMPANY

## EPA Method 5/202 Moisture Datasheet

Job Code

045AS - 289160

Date

12-5-17

Operator

ABunning

Run # HTG U1 R1

#1456

Tin 2256

Impinger	Tare Weight	Final Weight
Impinger 1	723.1	782.2
Impinger 2	682.5	714.1
Impinger 3	763.8	812.5
Impinger 4	723 + 878.6	911.6
Sum	3048.0	3220.4
Total Moisture Gain:	(172.4)	

Run # HTG U1 R2

#1454

Tin 2268

Impinger	Tare Weight	Final Weight
Impinger 1	715.3	785.3
Impinger 2	634.0	657.1
Impinger 3	544.1	610.7
Impinger 4	892.6	929.5
Sum	2786.0	2982.6
Total Moisture Gain:	(196.6)	

Run # HTG U1 R3

#1452

2316

Impinger	Tare Weight	Final Weight
Impinger 1	522.4	582.3
Impinger 2	651.2	676.6
Impinger 3	713.0	786.6
Impinger 4	739.2	769.9
Sum	2625.8	2815.4
Total Moisture Gain:	(189.6)	



**Project PC17-0001**  
**Appendix C: Lab Data**  
Gravimetric Analysis



## EPA Method 5/202 Gravimetric Analysis Report

Project Code: PC17-1.20  
Date Finalized: 12/16/2017  
Analyst: Kormylo

Laboratory Results Summary	
Sample ID	Filterable Particulate Matter (mg)
Huntington Unit 1, Run #1	25.7
Huntington Unit 1, Run #2	25.3
Huntington Unit 1, Run #3	24.3

### Analytical Narrative

Quartz fiber filters were dessicated and tared to a constant weight in the EMCo laboratory prior to sampling. Following testing, the filters were dessicated for at least 24 hours, then weighed to a constant weight ( $\pm 0.5$  mg). The acetone rinses were measured to the nearest milliliter, transferred to tared aluminum weighing dishes, taken to dryness under a fume hood, dessicated for at least 24 hours, then weighed to a constant weight ( $\pm 0.5$  mg). Each result above represents total filterable particulate matter for each test run (acetone rinse + filter catch), with no blank correction performed unless otherwise indicated.

### Instrumentation

All measurements were taken using a Torbal Model AGCN200 Analytical Balance under laboratory conditions. The instrument is auto-calibrated and challenged with three NIST-traceable reference weights daily.

### Detection Limit / Sensitivity

All measurements are recorded to 0.0001g (0.1mg).

### Notes

No deviations from the analytical procedures from EPA Method 5 were noted. All samples were received in good condition. After analysis, all samples are archived for a period of one year.

### Attachments

Gravimetric Analysis Logs  
Sample Chain of Custody



## EPA Method 5 Gravimetric Analysis Log

Project Code:	PC17-1.20
Unit ID:	Huntington Unit 1

### Front-Half Particulate Matter Filter Catch

Filter #	Run #1		Run #2		Run #3	
	Date	Weight (g)	Date	Weight (g)	Date	Weight (g)
Final Weight #1 (g)	12/11/17	0.3816	12/11/17	0.3833	12/11/17	0.3849
Final Weight #2 (g)	12/12/17	0.3815	12/12/17	0.3832	12/12/17	0.3848
Tare Weight #1 (g)	6/29/17	0.3753	6/29/17	0.3775	6/29/17	0.3784
Tare Weight #2 (g)	6/30/17	0.3755	6/30/17	0.3776	6/30/17	0.3787
Filter Catch (g)	<b>0.0062</b>		<b>0.0057</b>		<b>0.0063</b>	

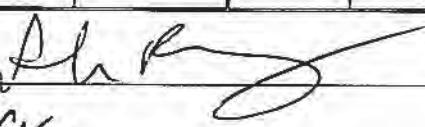
### Front-Half Particulate Matter Acetone Rinse Catch

Dish #	Run #1		Run #2		Run #3	
	Date	Weight (g)	Date	Weight (g)	Date	Weight (g)
Final Weight #1 (g)	12/11/17	6.3842	12/11/17	6.4369	12/11/17	6.3686
Final Weight #2 (g)	12/12/17	6.3844	12/12/17	6.4365	12/12/17	6.3884
Tare Weight #1 (g)	11/27/17	6.3648	11/27/17	6.4170	11/29/17	6.3604
Tare Weight #2 (g)	11/27/17	6.3647	11/27/17	6.4172	11/30/17	6.3605
Rinse Catch (g)	<b>0.0195</b>		<b>0.0196</b>		<b>0.0180</b>	

### Total Particulate Catch

	Run #1	Run #2	Run #3
Filter Catch (g)	0.0062	0.0057	0.0063
+ Rinse Catch (g)	0.0195	0.0196	0.0180
Total PM (g)	<b>0.0257</b>	<b>0.0253</b>	<b>0.0243</b>

## Laboratory Chain of Custody Record

Project Code:	045-AS-127698						
Client:	Pacificorp						
Facility:	Huntington						
Unit:	Unit 1+2						
Sample Date(s):	12-5, 12-6						
Project Manager:	Andrew Brunning						
Sample ID / Run #	Filter ID	Front ½ Acetone		Back ½ Hexane		Back ½ Water	
		Tin ID	Volume (mL)	Tin ID	Volume (mL)	Baggie ID	Volume (mL)
TB				2303	80m1	560	130m1
U1 R1	1456	2256	19.5	2301	125m1	583	150m1
U1 R2	1454	2268	19.6	2283	140m1	582	170m1
U1 R3	1452	2316	3.0	2310	120m1	581	150m1
U2 R1	1563	2312		2308	130m1	598	175m1
U2 R2	1560	2284		2306	100m1	550	125m1
U2 R3	1556	2304		2259	95m1	608	160m1
Relinquished by:				Date:	12/7/17		
Received by:				Date	n		



**Project PC17-0001**  
**Appendix D: CEMS Data**  
CEMS Printouts for Test Runs

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 07:04 Through 12/05/2017 09:19

Time Online Criteria: 1 minute(s)

Source	Parameter Unit	UNIT1				
		BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MMW)
12/05/17	07:04	23.927	10.9	0.4	94.12	477
12/05/17	07:05	23.928	11.0	0.4	93.65	480
12/05/17	07:06	23.928	11.0	0.3	93.49	482
12/05/17	07:07	23.928	11.0	0.4	93.90	484
12/05/17	07:08	23.928	11.0	0.4	94.48	485
12/05/17	07:09	23.928	11.0	0.4	94.41	485
12/05/17	07:10	23.928	11.0	0.4	94.34	484
12/05/17	07:11	23.928	10.9	0.3	94.49	484
12/05/17	07:12	23.928	10.9	0.4	94.61	483
12/05/17	07:13	23.929	10.8	0.3	95.42	480
12/05/17	07:14	23.929	10.8	0.3	95.65	479
12/05/17	07:15	23.930	10.7	0.3	95.89	477
12/05/17	07:16	23.929	10.6	0.4	95.99	476
12/05/17	07:17	23.929	10.7	0.3	95.66	476
12/05/17	07:18	23.930	10.8	0.4	95.67	477
12/05/17	07:19	23.931	10.8	0.3	95.77	478
12/05/17	07:20	23.930	11.0	0.4	95.72	481
12/05/17	07:21	23.931	11.1	0.3	95.77	485
12/05/17	07:22	23.932	11.0	0.4	95.57	487
12/05/17	07:23	23.931	11.0	0.4	95.55	488
12/05/17	07:24	23.931	11.0	0.3	95.82	487
12/05/17	07:25	23.931	10.9	0.3	96.18	485
12/05/17	07:26	23.930	10.9	0.3	96.56	483
12/05/17	07:27	23.930	10.8	0.3	96.97	481
12/05/17	07:28	23.930	10.7	0.3	97.22	479
12/05/17	07:29	23.930	10.7	0.3	96.91	478
12/05/17	07:30	23.931	10.7	0.3	96.63	478
12/05/17	07:31	23.932	10.7	0.4	96.65	478
12/05/17	07:32	23.932	10.8	0.4	96.53	479
12/05/17	07:33	23.933	10.9	0.4	95.89	481
12/05/17	07:34	23.934	11.0	0.4	95.88	482
12/05/17	07:35	23.934	10.9	0.4	96.01	484
12/05/17	07:36	23.934	10.9	0.4	96.02	484
12/05/17	07:37	23.934	10.9	0.4	95.73	485
12/05/17	07:38	23.936	10.9	0.4	95.61	485
12/05/17	07:39	23.936	10.9	0.4	95.78	484
12/05/17	07:40	23.936	10.9	0.4	95.93	483
12/05/17	07:41	23.936	10.8	0.4	95.70	482
12/05/17	07:42	23.936	10.9	0.4	94.64	482

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 07:04 Through 12/05/2017 09:19

Time Online Criteria: 1 minute(s)

12/05/17	07:43	23.937	10.9	0.4	94.37	482
12/05/17	07:44	23.937	10.8	0.4	94.80	483
12/05/17	07:45	23.936	10.9	0.4	95.17	483
12/05/17	07:46	23.937	10.8	0.4	95.20	483
12/05/17	07:47	23.937	10.9	0.4	95.26	483
12/05/17	07:48	23.937	10.9	0.4	95.82	481
12/05/17	07:49	23.938	10.8	0.4	96.24	481
12/05/17	07:50	23.939	10.7	0.4	96.18	479
12/05/17	07:51	23.938	10.8	0.3	95.91	478
12/05/17	07:52	23.939	10.8	0.4	95.75	479
12/05/17	07:53	23.939	10.8	0.4	95.35	479
12/05/17	07:54	23.939	10.8	0.4	94.54	480
12/05/17	07:55	23.939	10.9	0.4	94.29	481
12/05/17	07:56	23.939	10.9	0.4	94.93	483
12/05/17	07:57	23.939	10.9	0.4	95.48	484
12/05/17	07:58	23.939	10.9	0.3	95.34	484
12/05/17	07:59	23.939	10.9	0.4	95.14	484
12/05/17	08:00	23.939	10.9	0.4	94.95	484
12/05/17	08:01	23.939	6.3 I	0.3	95.10	483
12/05/17	08:02	23.940	8.6 I	0.4	95.49	483
12/05/17	08:03	23.940	10.8 I	0.3	95.75	482
12/05/17	08:04	23.940	10.9 I	0.3	95.67	481
12/05/17	08:05	23.940	10.9	0.4	95.09	482
12/05/17	08:06	23.940	10.9	0.4	95.56	482
12/05/17	08:07	23.941	11.0	0.4	94.03	483
12/05/17	08:08	23.942	11.0	0.4	94.36	483
12/05/17	08:09	23.941	10.9	0.4	94.74	483
12/05/17	08:10	23.944	10.9	0.4	95.50	483
12/05/17	08:11	23.943	10.8	0.3	96.16	482
12/05/17	08:12	23.943	10.7	0.3	96.17	481
12/05/17	08:13	23.942	10.8	0.3	96.28	479
12/05/17	08:14	23.942	10.7	0.3	96.66	478
12/05/17	08:15	23.942	10.7	0.4	95.93	478
12/05/17	08:16	23.944	10.8	0.4	95.64	478
12/05/17	08:17	23.943	10.8	0.4	95.68	479
12/05/17	08:18	23.943	10.8	0.4	95.49	480
12/05/17	08:19	23.942	10.9	0.4	95.51	480
12/05/17	08:20	23.942	10.9	0.4	95.04	481
12/05/17	08:21	23.943	11.0	0.4	94.53	482
12/05/17	08:22	23.944	10.9	0.4	94.49	483
12/05/17	08:23	23.944	11.0	0.4	94.45	485
12/05/17	08:24	23.944	11.0	0.4	94.48	486

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 07:04 Through 12/05/2017 09:19

Time Online Criteria: 1 minute(s)

12/05/17	08:25	23.944	11.0	0.4	94.76	486
12/05/17	08:26	23.945	10.9	0.3	94.69	485
12/05/17	08:27	23.945	10.9	0.3	94.92	484
12/05/17	08:28	23.945	10.8	0.3	95.53	482
12/05/17	08:29	23.946	10.8	0.3	95.68	481
12/05/17	08:30	23.945	10.8	0.4	95.69	480
12/05/17	08:31	23.945	10.9	0.3	95.57	481
12/05/17	08:32	23.945	10.9	0.4	95.15	482
12/05/17	08:33	23.946	10.9	0.4	94.71	483
12/05/17	08:34	23.945	10.9	0.3	95.51	484
12/05/17	08:35	23.946	10.9	0.4	95.04	485
12/05/17	08:36	23.946	10.9	0.4	95.62	485
12/05/17	08:37	23.945	10.9	0.3	95.71	484
12/05/17	08:38	23.946	10.9	0.4	96.17	482
12/05/17	08:39	23.946	10.7	0.4	96.12	480
12/05/17	08:40	23.946	10.7	0.4	95.66	479
12/05/17	08:41	23.948	10.8	0.4	95.99	479
12/05/17	08:42	23.948	10.8	0.4	95.92	480
12/05/17	08:43	23.949	10.9	0.4	94.92	481
12/05/17	08:44	23.950	11.0	0.4	94.49	483
12/05/17	08:45	23.950	10.9	0.4	94.63	485
12/05/17	08:46	23.949	11.0	0.4	94.92	485
12/05/17	08:47	23.951	10.9	0.4	95.69	484
12/05/17	08:48	23.951	10.8	0.4	96.31	483
12/05/17	08:49	23.951	10.8	0.4	95.92	482
12/05/17	08:50	23.952	10.7	0.4	95.56	480
12/05/17	08:51	23.953	10.8	0.4	95.38	480
12/05/17	08:52	23.952	10.9	0.4	95.59	480
12/05/17	08:53	23.953	10.8	0.4	96.17	481
12/05/17	08:54	23.953	10.8	0.4	96.42	481
12/05/17	08:55	23.954	10.9	0.3	96.00	481
12/05/17	08:56	23.954	10.9	0.3	96.09	482
12/05/17	08:57	23.955	10.8	0.3	96.07	481
12/05/17	08:58	23.956	10.9	0.3	95.84	481
12/05/17	08:59	23.956	10.8	0.4	95.64	481
12/05/17	09:00	23.956	10.8	0.4	95.22	482
12/05/17	09:01	23.956	10.9	0.4	94.77	482
12/05/17	09:02	23.956	11.1	0.4	95.10	484
12/05/17	09:03	23.957	11.0	0.3	95.77	485
12/05/17	09:04	23.957	10.9	0.4	96.12	485
12/05/17	09:05	23.957	10.8	0.4	95.84	485
12/05/17	09:06	23.958	10.8	0.4	95.82	483

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 07:04 Through 12/05/2017 09:19

Time Online Criteria: 1 minute(s)

12/05/17	09:07	23.959	10.9	0.3	96.42	482
12/05/17	09:08	23.959	10.8	0.3	96.52	480
12/05/17	09:09	23.958	10.7	0.4	96.29	479
12/05/17	09:10	23.959	10.7	0.3	95.97	479
12/05/17	09:11	23.959	10.8	0.4	96.05	478
12/05/17	09:12	23.960	10.9	0.4	96.05	479
12/05/17	09:13	23.961	10.9	0.4	95.92	481
12/05/17	09:14	23.962	10.9	0.3	95.70	482
12/05/17	09:15	23.963	11.0	0.3	95.32	483
12/05/17	09:16	23.964	11.0	0.3	95.37	483
12/05/17	09:17	23.964	10.9	0.3	95.93	483
12/05/17	09:18	23.964	10.8	0.4	95.92	483
12/05/17	09:19	23.966	10.8	0.4	95.87	482

Average	23.943	10.9	0.4	95.51	482
Minimum	23.927	10.6	0.3	93.49	476
Maximum	23.966	11.1	0.4	97.22	488
Summation	3,256.209	1,434.3	50.1	12,989.38	65,529

Geometric Mean

Included Data Points	136	132	136	136	136
Total number of Data Points	136	136	136	136	136

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

Report Generated 12/05/2017 09:58

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 10:01 Through 12/05/2017 13:16

Time Online Criteria: 1 minute(s)

Source Parameter Unit	UNIT1				
	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEG F)	UNITLOAD (MW)
12/05/17 10:01	23.980	10.9	0.4	101.43	479
12/05/17 10:02	23.980	10.8	0.4	100.70	479
12/05/17 10:03	23.980	10.8	0.4	100.54	479
12/05/17 10:04	23.979	10.8	0.5	100.21	479
12/05/17 10:05	23.980	10.9	0.4	99.62	480
12/05/17 10:06	23.979	10.9	0.4	99.34	481
12/05/17 10:07	23.979	10.9	0.4	99.17	482
12/05/17 10:08	23.980	11.0	0.4	98.96	481
12/05/17 10:09	23.981	10.9	0.4	99.16	482
12/05/17 10:10	23.981	10.9	0.4	98.96	483
12/05/17 10:11	23.982	11.1	0.4	98.76	484
12/05/17 10:12	23.982	11.0	0.4	99.23	484
12/05/17 10:13	23.983	10.9	0.4	99.42	484
12/05/17 10:14	23.982	10.9	0.4	99.15	483
12/05/17 10:15	23.982	10.8	0.4	98.90	482
12/05/17 10:16	23.982	10.8	0.4	98.76	481
12/05/17 10:17	23.983	10.8	0.4	98.63	481
12/05/17 10:18	23.983	10.8	0.4	98.12	481
12/05/17 10:19	23.982	11.0	0.4	97.45	482
12/05/17 10:20	23.981	11.1	0.4	97.33	484
12/05/17 10:21	23.981	11.0	0.4	97.65	485
12/05/17 10:22	23.980	11.0	0.4	97.99	484
12/05/17 10:23	23.980	10.8	0.4	98.46	483
12/05/17 10:24	23.979	10.8	0.4	98.20	482
12/05/17 10:25	23.978	10.8	0.4	97.99	481
12/05/17 10:26	23.978	10.8	0.4	98.62	480
12/05/17 10:27	23.978	10.7	0.4	98.68	478
12/05/17 10:28	23.978	10.8	0.4	98.32	478
12/05/17 10:29	23.978	10.8	0.4	98.34	479
12/05/17 10:30	23.979	10.9	0.4	98.28	481
12/05/17 10:31	23.978	11.0	0.4	98.25	482
12/05/17 10:32	23.977	11.0	0.4	98.20	483
12/05/17 10:33	23.977	10.9	0.4	97.99	484
12/05/17 10:34	23.978	11.0	0.4	97.92	485
12/05/17 10:35	23.978	11.0	0.4	98.05	485
12/05/17 10:36	23.978	10.9	0.4	98.68	484
12/05/17 10:37	23.977	10.8	0.4	99.22	482
12/05/17 10:38	23.979	10.8	0.4	99.80	481

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 10:01 Through 12/05/2017 13:16

Time Online Criteria: 1 minute(s)

12/05/17	10:39	23.979	10.8	0.4	99.97	480
12/05/17	10:40	23.979	10.9	0.4	99.31	481
12/05/17	10:41	23.979	11.0	0.4	98.42	482
12/05/17	10:42	23.979	10.9	0.4	98.04	483
12/05/17	10:43	23.979	10.9	0.4	98.02	484
12/05/17	10:44	23.979	10.9	0.4	98.67	483
12/05/17	10:45	23.979	10.8	0.4	99.39	483
12/05/17	10:46	23.979	10.8	0.4	99.44	483
12/05/17	10:47	23.978	10.9	0.4	98.64	482
12/05/17	10:48	23.978	11.0	0.4	98.70	482
12/05/17	10:49	23.977	10.9	0.4	99.09	482
12/05/17	10:50	23.977	10.8	0.4	98.45	482
12/05/17	10:51	23.978	10.9	0.4	98.28	483
12/05/17	10:52	23.978	10.9	0.4	98.39	483
12/05/17	10:53	23.978	10.8	0.4	98.45	483
12/05/17	10:54	23.978	10.9	0.4	98.67	483
12/05/17	10:55	23.978	10.8	0.4	98.43	483
12/05/17	10:56	23.978	10.9	0.4	98.50	484
12/05/17	10:57	23.978	11.1	0.4	98.84	486
12/05/17	10:58	23.978	11.0	0.4	99.04	487
12/05/17	10:59	23.978	10.9	0.4	98.78	487
12/05/17	11:00	23.978	10.9	0.4	98.70	487
12/05/17	11:01	23.977	10.9	0.4	98.74	486
12/05/17	11:02	23.978	10.9	0.4	98.84	485
12/05/17	11:03	23.978	10.9	0.4	99.69	484
12/05/17	11:04	23.979	10.7	0.4	100.32	483
12/05/17	11:05	23.979	10.8	0.4	100.19	482
12/05/17	11:06	23.979	10.8	0.4	100.66	482
12/05/17	11:07	23.979	10.8	0.4	99.81	481
12/05/17	11:08	23.978	10.8	0.4	99.37	482
12/05/17	11:09	23.977	10.8	0.4	98.99	481
12/05/17	11:10	23.977	10.8	0.4	99.15	482
12/05/17	11:11	23.977	10.8	0.4	99.08	482
12/05/17	11:12	23.977	10.8	0.4	99.02	482
12/05/17	11:13	23.976	10.8	0.4	99.20	482
12/05/17	11:14	23.976	10.8	0.4	99.33	481
12/05/17	11:15	23.973	10.9	0.4	99.60	481
12/05/17	11:16	23.974	10.8	0.4	99.91	480
12/05/17	11:17	23.974	10.8	0.4	99.56	480
12/05/17	11:18	23.973	10.9	0.4	99.17	481
12/05/17	11:19	23.972	10.9	0.4	99.11	481

F = Unit Offline

E = Exceedance

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T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 10:01 Through 12/05/2017 13:16

Time Online Criteria: 1 minute(s)

12/05/17	11:20	23.972	11.0	0.4	99.50	482
12/05/17	11:21	23.972	10.9	0.4	99.92	483
12/05/17	11:22	23.972	10.8	0.4	99.99	485
12/05/17	11:23	23.972	10.9	0.4	100.11	484
12/05/17	11:24	23.971	10.9	0.4	100.09	484
12/05/17	11:25	23.970	10.9	0.4	99.87	483
12/05/17	11:26	23.969	10.8	0.4	100.09	482
12/05/17	11:27	23.968	10.7	0.4	100.34	480
12/05/17	11:28	23.966	10.8	0.4	100.28	479
12/05/17	11:29	23.965	10.7	0.4	100.16	478
12/05/17	11:30	23.965	10.7	0.4	99.73	479
12/05/17	11:31	23.964	10.8	0.4	99.22	480
12/05/17	11:32	23.963	11.0	0.4	98.77	482
12/05/17	11:33	23.963	11.0	0.4	98.55	484
12/05/17	11:34	23.964	11.0	0.4	98.66	486
12/05/17	11:35	23.963	10.9	0.4	99.13	486
12/05/17	11:36	23.964	10.9	0.4	99.08	485
12/05/17	11:37	23.963	11.0	0.4	99.19	484
12/05/17	11:38	23.963	10.9	0.4	99.07	483
12/05/17	11:39	23.962	10.8	0.4	99.98	482
12/05/17	11:40	23.961	10.8	0.4	100.83	482
12/05/17	11:41	23.961	10.8	0.4	100.70	482
12/05/17	11:42	23.960	10.9	0.4	100.46	482
12/05/17	11:43	23.959	10.9	0.4	100.24	484
12/05/17	11:44	23.958	11.0	0.4	100.34	483
12/05/17	11:45	23.957	10.8	0.4	100.88	482
12/05/17	11:46	23.957	10.7	0.4	100.72	482
12/05/17	11:47	23.956	10.8	0.4	100.73	481
12/05/17	11:48	23.956	10.8	0.4	100.75	479
12/05/17	11:49	23.957	10.8	0.4	100.56	479
12/05/17	11:50	23.957	10.8	0.4	100.21	479
12/05/17	11:51	23.957	10.9	0.4	99.36	480
12/05/17	11:52	23.957	10.9	0.4	99.16	481
12/05/17	11:53	23.957	10.8	0.4	99.15	481
12/05/17	11:54	23.956	10.8	0.4	99.34	482
12/05/17	11:55	23.955	10.9	0.4	100.04	481
12/05/17	11:56	23.955	10.8	0.4	101.04	480
12/05/17	11:57	23.955	10.6	0.4	101.98	479
12/05/17	11:58	23.954	10.6	0.4	101.28	478
12/05/17	11:59	23.954	10.8	0.4	100.20	478
12/05/17	12:00	23.953	10.9	0.4	100.10	479

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 10:01 Through 12/05/2017 13:16

Time Online Criteria: 1 minute(s)

12/05/17	12:01	23.953	6.2	0.4	100.49	479
12/05/17	12:02	23.952	8.4	0.4	100.58	480
12/05/17	12:03	23.949	10.8	0.4	100.28	481
12/05/17	12:04	23.950	10.9	0.4	100.11	482
12/05/17	12:05	23.951	10.9	0.4	99.87	483
12/05/17	12:06	23.950	11.0	0.4	99.75	483
12/05/17	12:07	23.950	10.9	0.4	99.82	482
12/05/17	12:08	23.949	10.8	0.4	99.63	482
12/05/17	12:09	23.948	10.9	0.4	99.34	482
12/05/17	12:10	23.947	10.9	0.4	99.71	482
12/05/17	12:11	23.947	10.9	0.4	100.40	482
12/05/17	12:12	23.946	10.8	0.4	100.57	481
12/05/17	12:13	23.946	10.7	0.4	100.66	481
12/05/17	12:14	23.946	10.7	0.4	100.96	482
12/05/17	12:15	23.946	10.9	0.4	100.55	482
12/05/17	12:16	23.946	11.0	0.4	100.06	483
12/05/17	12:17	23.947	11.0	0.4	100.11	484
12/05/17	12:18	23.947	10.9	0.4	100.16	484
12/05/17	12:19	23.947	10.9	0.4	100.54	485
12/05/17	12:20	23.947	10.8	0.4	101.02	484
12/05/17	12:21	23.946	10.9	0.4	100.75	484
12/05/17	12:22	23.945	10.9	0.4	101.28	483
12/05/17	12:23	23.945	10.7	0.4	102.21	482
12/05/17	12:24	23.944	10.8	0.4	101.96	481
12/05/17	12:25	23.943	10.8	0.4	101.75	479
12/05/17	12:26	23.942	10.8	0.4	101.75	478
12/05/17	12:27	23.942	10.7	0.4	101.38	477
12/05/17	12:28	23.941	10.7	0.4	101.34	476
12/05/17	12:29	23.940	10.7	0.4	101.71	477
12/05/17	12:30	23.940	10.7	0.4	101.30	478
12/05/17	12:31	23.939	10.8	0.4	100.76	479
12/05/17	12:32	23.938	11.0	0.4	100.03	480
12/05/17	12:33	23.939	10.8	0.4	99.72	480
12/05/17	12:34	23.939	10.9	0.4	99.86	483
12/05/17	12:35	23.939	10.9	0.4	100.15	483
12/05/17	12:36	23.939	10.9	0.4	100.52	482
12/05/17	12:37	23.939	10.9	0.4	100.19	483
12/05/17	12:38	23.938	10.9	0.4	100.30	482
12/05/17	12:39	23.937	10.9	0.4	100.84	482
12/05/17	12:40	23.937	10.8	0.4	100.81	481
12/05/17	12:41	23.937	10.9	0.4	100.64	481

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 10:01 Through 12/05/2017 13:16

Time Online Criteria: 1 minute(s)

12/05/17	12:42	23.937	10.9	0.4	100.74	481
12/05/17	12:43	23.937	11.0	0.4	100.81	483
12/05/17	12:44	23.938	11.0	0.4	100.46	484
12/05/17	12:45	23.938	11.0	0.4	100.42	485
12/05/17	12:46	23.937	10.9	0.3	101.33	485
12/05/17	12:47	23.936	10.8	0.4	101.91	485
12/05/17	12:48	23.936	10.8	0.4	102.12	484
12/05/17	12:49	23.935	10.8	0.4	102.15	482
12/05/17	12:50	23.935	10.8	0.4	101.83	480
12/05/17	12:51	23.935	10.7	0.4	101.54	478
12/05/17	12:52	23.935	10.7	0.4	101.60	478
12/05/17	12:53	23.935	10.7	0.4	101.68	478
12/05/17	12:54	23.935	10.8	0.4	101.51	479
12/05/17	12:55	23.935	10.9	0.4	101.23	480
12/05/17	12:56	23.935	10.9	0.4	101.24	482
12/05/17	12:57	23.935	11.0	0.4	100.99	484
12/05/17	12:58	23.935	11.0	0.4	100.55	485
12/05/17	12:59	23.935	11.0	0.4	100.52	486
12/05/17	13:00	23.935	11.0	0.4	100.75	486
12/05/17	13:01	23.935	10.9	0.4	101.36	486
12/05/17	13:02	23.936	10.9	0.4	102.08	484
12/05/17	13:03	23.936	10.8	0.4	102.22	482
12/05/17	13:04	23.935	10.8	0.4	102.20	482
12/05/17	13:05	23.935	10.8	0.4	101.93	481
12/05/17	13:06	23.935	10.8	0.4	101.54	481
12/05/17	13:07	23.934	10.8	0.4	101.32	481
12/05/17	13:08	23.934	10.8	0.4	101.15	482
12/05/17	13:09	23.935	10.9	0.4	100.90	482
12/05/17	13:10	23.935	11.0	0.4	101.32	483
12/05/17	13:11	23.934	10.9	0.4	101.75	484
12/05/17	13:12	23.933	10.9	0.4	101.65	484
12/05/17	13:13	23.933	10.9	0.4	101.53	484
12/05/17	13:14	23.932	10.8	0.4	101.57	484
12/05/17	13:15	23.932	10.9	0.4	101.71	484
12/05/17	13:16	23.931	10.9	0.4	102.01	484

Average            23.960  
Minimum          23.931

**F = Unit Offline**  
**E = Exceedance**  
**M = Maintenance**  
**T = Out Of Control**  
**C = Calibration**  
**S = Substituted**  
**\* = Suspect**

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 10:01 Through 12/05/2017 13:16

Time Online Criteria: 1 minute(s)

Maximum	23.983	11.1	0.5	102.22	487
Summation	4,696.167	2,085.6	78.4	19,589.72	94,472

Geometric Mean

Included Data Points	196	192	196	196	196
Total number of Data Points	196	196	196	196	196

**F = Unit Offline**

**E = Exceedance**

**M = Maintenance**

**T = Out Of Control**

Report Generated 12/05/17 13:35

**C = Calibration**

**S = Substituted**

**\* = Suspect**

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 13:52 Through 12/05/2017 16:04

Time Online Criteria: 1 minute(s)

Source Parameter Unit	UNIT1				
	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEG F)	UNITLOAD (MW)
12/05/17 13:52	23.924	10.9	0.4	103.26	483
12/05/17 13:53	23.924	10.9	0.4	103.12	485
12/05/17 13:54	23.924	10.9	0.3	103.22	485
12/05/17 13:55	23.923	10.9	0.4	102.94	486
12/05/17 13:56	23.923	10.9	0.4	102.12	486
12/05/17 13:57	23.923	10.9	0.4	102.32	485
12/05/17 13:58	23.924	10.7	0.4	103.30	484
12/05/17 13:59	23.924	10.6	0.4	103.61	481
12/05/17 14:00	23.924	10.6	0.3	103.73	479
12/05/17 14:01	23.924	10.5	0.4	103.96	477
12/05/17 14:02	23.924	10.5	0.3	102.99	476
12/05/17 14:03	23.924	10.6	0.3	102.18	476
12/05/17 14:04	23.924	10.7	0.3	102.14	478
12/05/17 14:05	23.924	10.8	0.4	101.31	480
12/05/17 14:06	23.924	10.9	0.4	100.47	484
12/05/17 14:07	23.923	11.0	0.4	100.20	486
12/05/17 14:08	23.923	11.0	0.3	100.60	488
12/05/17 14:09	23.924	10.9	0.4	101.39	487
12/05/17 14:10	23.924	10.8	0.4	102.03	486
12/05/17 14:11	23.924	10.9	0.4	101.86	484
12/05/17 14:12	23.923	10.8	0.3	101.45	483
12/05/17 14:13	23.923	10.7	0.3	102.29	481
12/05/17 14:14	23.923	10.6	0.4	102.60	480
12/05/17 14:15	23.922	10.6	0.4	102.30	480
12/05/17 14:16	23.922	10.6	0.4	102.43	479
12/05/17 14:17	23.922	10.7	0.4	102.34	480
12/05/17 14:18	23.922	10.7	0.4	102.51	481
12/05/17 14:19	23.922	10.6	0.4	102.83	481
12/05/17 14:20	23.923	10.6	0.4	102.65	481
12/05/17 14:21	23.922	10.6	0.4	102.19	481
12/05/17 14:22	23.922	10.7	0.3	102.10	481
12/05/17 14:23	23.921	10.7	0.4	102.17	481
12/05/17 14:24	23.921	10.7	0.4	102.21	481
12/05/17 14:25	23.921	10.7	0.4	102.48	481
12/05/17 14:26	23.921	10.7	0.3	102.33	482
12/05/17 14:27	23.921	10.9	0.3	101.79	482
12/05/17 14:28	23.921	10.8	0.4	101.39	482
12/05/17 14:29	23.921	10.8	0.4	101.13	482

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 13:52 Through 12/05/2017 16:04

Time Online Criteria: 1 minute(s)

12/05/17	14:30	23.921	10.8	0.3	101.23	482
12/05/17	14:31	23.921	10.8	0.4	102.13	481
12/05/17	14:32	23.921	10.6	0.4	102.52	481
12/05/17	14:33	23.921	10.7	0.4	102.76	480
12/05/17	14:34	23.920	10.7	0.4	102.63	480
12/05/17	14:35	23.920	10.8	0.3	102.04	481
12/05/17	14:36	23.919	10.8	0.4	101.16	482
12/05/17	14:37	23.919	10.9	0.4	101.10	483
12/05/17	14:38	23.918	10.8	0.3	102.30	483
12/05/17	14:39	23.918	10.7	0.3	102.42	483
12/05/17	14:40	23.918	10.7	0.4	101.77	482
12/05/17	14:41	23.918	10.7	0.3	102.00	482
12/05/17	14:42	23.918	10.7	0.4	102.20	480
12/05/17	14:43	23.918	10.7	0.4	102.30	480
12/05/17	14:44	23.917	10.7	0.4	101.91	480
12/05/17	14:45	23.917	10.7	0.3	101.17	481
12/05/17	14:46	23.917	10.9	0.4	100.61	481
12/05/17	14:47	23.917	10.8	0.4	101.06	482
12/05/17	14:48	23.917	10.8	0.3	101.33	483
12/05/17	14:49	23.917	10.8	0.3	100.89	483
12/05/17	14:50	23.916	10.8	0.3	101.32	483
12/05/17	14:51	23.916	10.8	0.4	101.77	484
12/05/17	14:52	23.916	10.8	0.4	101.79	483
12/05/17	14:53	23.916	10.8	0.3	101.59	483
12/05/17	14:54	23.917	10.8	0.4	101.74	482
12/05/17	14:55	23.917	10.7	0.4	102.25	481
12/05/17	14:56	23.918	10.6	0.4	102.78	480
12/05/17	14:57	23.918	10.6	0.4	102.45	480
12/05/17	14:58	23.918	10.8	0.4	101.87	481
12/05/17	14:59	23.918	10.7	0.4	101.64	481
12/05/17	15:00	23.918	10.8	0.4	101.76	482
12/05/17	15:01	23.918	10.8	0.3	102.01	483
12/05/17	15:02	23.919	10.8	0.3	101.78	486
12/05/17	15:03	23.919	10.8	0.4	101.30	485
12/05/17	15:04	23.918	10.9	0.3	101.08	485
12/05/17	15:05	23.919	10.8	0.4	101.13	485
12/05/17	15:06	23.919	10.8	0.3	101.82	484
12/05/17	15:07	23.919	10.7	0.3	102.44	482
12/05/17	15:08	23.919	10.6	0.3	102.69	480
12/05/17	15:09	23.919	10.6	0.3	102.86	478
12/05/17	15:10	23.920	10.6	0.3	102.30	477

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 13:52 Through 12/05/2017 16:04

Time Online Criteria: 1 minute(s)

12/05/17	15:11	23.920	10.6	0.3	101.64	477
12/05/17	15:12	23.920	10.7	0.3	101.46	479
12/05/17	15:13	23.920	10.8	0.3	101.06	481
12/05/17	15:14	23.920	10.9	0.3	100.65	482
12/05/17	15:15	23.920	10.9	0.3	100.78	485
12/05/17	15:16	23.920	10.8	0.4	101.02	485
12/05/17	15:17	23.920	10.7	0.3	101.70	484
12/05/17	15:18	23.921	10.8	0.3	102.14	483
12/05/17	15:19	23.921	10.8	0.3	101.93	482
12/05/17	15:20	23.921	10.7	0.3	101.59	481
12/05/17	15:21	23.921	10.7	0.3	101.63	480
12/05/17	15:22	23.922	10.6	0.4	102.04	480
12/05/17	15:23	23.922	10.7	0.4	102.61	479
12/05/17	15:24	23.922	10.7	0.4	102.18	479
12/05/17	15:25	23.922	10.8	0.3	101.43	481
12/05/17	15:26	23.923	10.8	0.4	102.12	481
12/05/17	15:27	23.923	10.8	0.4	102.08	483
12/05/17	15:28	23.923	10.8	0.4	101.37	484
12/05/17	15:29	23.923	10.9	0.4	100.92	485
12/05/17	15:30	23.924	10.8	0.4	101.49	485
12/05/17	15:31	23.924	10.7	0.4	102.17	485
12/05/17	15:32	23.924	10.8	0.4	102.22	484
12/05/17	15:33	23.924	10.7	0.4	101.93	483
12/05/17	15:34	23.924	10.7	0.4	101.95	482
12/05/17	15:35	23.924	10.7	0.4	102.14	481
12/05/17	15:36	23.923	10.7	0.3	102.07	481
12/05/17	15:37	23.923	10.7	0.4	101.82	481
12/05/17	15:38	23.923	10.7	0.3	102.00	481
12/05/17	15:39	23.922	10.8	0.3	102.33	482
12/05/17	15:40	23.922	10.8	0.3	102.27	482
12/05/17	15:41	23.922	10.7	0.3	101.75	481
12/05/17	15:42	23.923	10.7	0.3	101.81	481
12/05/17	15:43	23.922	10.8	0.3	102.04	482
12/05/17	15:44	23.922	10.8	0.3	101.81	482
12/05/17	15:45	23.922	10.7	0.3	101.51	482
12/05/17	15:46	23.922	10.7	0.3	101.36	483
12/05/17	15:47	23.922	10.7	0.3	101.13	483
12/05/17	15:48	23.923	10.7	0.3	102.10	482
12/05/17	15:49	23.923	10.7	0.3	102.10	481
12/05/17	15:50	23.922	10.8	0.3	101.87	481
12/05/17	15:51	23.923	10.7	0.3	101.89	480

F = Unit Offline

E = Exceedance

M = Maintenance

T = Out Of Control

C = Calibration

S = Substituted

\* = Suspect

# Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 12/05/2017 13:52 Through 12/05/2017 16:04

Time Online Criteria: 1 minute(s)

12/05/17	15:52	23.923	10.7	0.3	102.06	480
12/05/17	15:53	23.922	10.7	0.3	101.99	480
12/05/17	15:54	23.923	10.7	0.3	102.13	481
12/05/17	15:55	23.923	10.7	0.3	101.83	481
12/05/17	15:56	23.923	10.8	0.3	101.13	482
12/05/17	15:57	23.922	10.9	0.3	101.05	483
12/05/17	15:58	23.922	10.9	0.3	101.69	485
12/05/17	15:59	23.922	10.9	0.3	101.85	486
12/05/17	16:00	23.923	10.8	0.3	102.23	487
12/05/17	16:01	23.923	6.2	0.3	102.59	487
12/05/17	16:02	23.923	8.7	0.3	102.65	486
12/05/17	16:03	23.923	10.7	0.3	103.17	484
12/05/17	16:04	23.923	10.7	0.3	103.35	483

Average 23.921 10.8 0.3 101.97 482

Minimum 23.916 10.5 0.3 100.20 476

Maximum 23.924 11.0 0.4 103.96 488

Summation 3,181.519 1,386.8 46.4 13,561.67 64,111

Geometric Mean

Included Data Points 133 129 133 133 133

Total number of Data Points 133 133 133 133 133

**F = Unit Offline**

**E = Exceedance**

**M = Maintenance**

**T = Out Of Control**

**C = Calibration**

**S = Substituted**

**\* = Suspect**



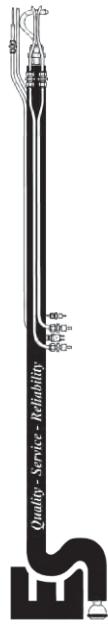
**Project PC17-0001**

**Appendix E: Calibration Information**

Dry Gas Meter Pre-Test and Post-Test Calibrations  
Critical Orifice Calibration Certificate



## METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES



**EMCO**  
EMISSIONS MEASUREMENT COMPANY

### ENVIRONMENTAL SUPPLY COMPANY

DATE:	12/27/2017	METER SERIAL #:	18654640
METER ID #:	N5-2	CRITICAL ORIFICE SET SERIAL #:	1531's

		DGM READINGS (ft <sup>3</sup> )		BAROMETRIC PRESSURE (in Hg):		INITIAL	FINAL	AVG (P <sub>bar</sub> )
ORIFICE #	RUN #	INITIAL	FINAL	NET (V <sub>m</sub> )				
23	1	746.601	746.136	3.635	57	20	19	21
	2	746.136	749.712	3.576	57	24	21	23
	3	749.712	753.270	3.568	57	29	33	27

ORIFICE #	RUN #	TESTED K' FACTOR	TESTED VACUUM (in Hg)	TEMPERATURES °F			DGM OUTLET θ	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H <sub>2</sub> O)	(1) V <sub>cr</sub> (STD)	(2) Y	(3) Y	Y % Diff to Average Y	Y % Diff with other orifices	ΔH <sub>@</sub>		
				AMBIENT	DGM INLET	DGM FINAL												
23	1	0.6055	16.5	746.601	746.136	3.635	57	20	19	21	5.00	1.8	3.2136	3.2818	1.021	2.14		
	2	0.6055	16.5	746.136	749.712	3.576	57	24	21	23	5.00	1.8	3.2290	3.2818	1.016	2.12		
	3	0.6055	16.5	749.712	753.270	3.568	57	29	33	27	5.00	1.8	3.1881	3.2818	1.029	2.11		
18	1	0.4772	17	758.382	761.231	2.849	57	38	40	32	34	36	5.00	1.1	2.5064	2.5864	1.032	2.03
	2	0.4772	17	761.231	764.085	2.854	57	40	42	34	37	38.25	5.00	1.1	2.4994	2.5864	1.035	2.02
16	1	0.4322	17.5	753.270	755.822	2.552	57	33	36	27	30	31.5	5.00	0.88	2.2642	2.3425	1.035	2.00
	2	0.4322	17.5	755.822	758.382	2.560	57	36	38	30	32	34	5.00	0.88	2.2598	2.3425	1.037	1.99

### USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V<sub>c</sub>(std), and the critical orifice, V<sub>o</sub>(std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

### AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 1.0304

#### INITIAL DRY GAS METER CALIBRATION FACTOR, Y =

$$\Delta H_{@} = \left( \frac{0.75 \theta}{V_{cr}(std)} \right)^2 \Delta H \left( \frac{V_m(std)}{V_m} \right)$$

#### % DIFFERENCE =

$$\text{AVERAGE } \Delta H_{@} = 2.06$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K<sub>1</sub> = 17.64 (Rin, Hg (English), 0.3558 °K/mm Hg (Metric))

T<sub>m</sub> = Absolute DGM avg. temperature (R - English, °K - Metric)

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T<sub>o</sub> = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K factor from Critical Orifice Calibration

$$(1) \quad Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

$$(2) \quad Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

$$(3) \quad Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

40 CFR Part 60, Appendix A-1 Method 2 §10.3: Temperature Sensors. After each field use, calibrate thermocouples at a temperature within 10% of the average absolute stack temperature. A reference thermocouple and potentiometer (calibrated against NIST standards) may be used. The absolute temperature measured with the sensor being calibrated and the reference sensor must agree within 1.5%.

### Pre-calibration Procedure

- Check max vacuum (1-22 1/2 "Hg), leak check. Use WD-40 if necessary.
- Check pump oil fill level and pump knockout. Make sure there is extra pump oil
- Check gauge oil on manometer. Add oil if necessary. Check for spare oil in back of meter.
- Wipe interior and exterior of meter clean with wet rag/soap.
- Check for missing or loose screws on meter box, pump housing and manometer.
- Proceed to meter and thermocouple calibration.
- Initial here upon completion \_\_\_\_\_ WS

### Thermocouple Calibration using NIST Traceable PIE Model 520 Calibrator

Reference Value:

250

Console Value:

250

Percent Difference:

0.0%

Acceptance Criteria: ±1.5%

Practical Instrument Electronics Tel: (860) 872-2000 • Fax: (860) 872-2638	S/N 107078
CERTIFICATE OF CALIBRATION	
This is to certify that your instrument has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology (Formerly NBS) within the terms of the NIST Calibration Services. Actual records pertaining to these standards are on file and are available for examination.	
Certified by: Practical Instrument Electronics Recommended Recalibration: Annually	
Model Number	520-K
Serial No.	S/N 107078
Calibration Date	02-03-09
In Service Date	Calibration Due _____



**MONTROSE**  
AIR QUALITY SERVICES

**METHOD 5 CRITICAL ORIFICE SET CALIBRATION**

ORIFICE SET	1230
ORIFICE SERIES	CO-1721S
METER GAMMA	0.9951

CALIBRATION CONDITIONS			
DATE STARTED	08/01/17		
DATE FINISHED	08/01/17		
CALIBRATION TECH	RS		

**CALIBRATION DATA**

Date	Orifice Number	Barometric Pressure	Theoretical Critical Vacuum	REFERENCE METER								RESULTS					
				DGM dH	Volume Initial	Volume Final	Total Volume	Standard Volume	Outlet Temp	Outlet Temp	Ambient Temp	Actual Vacuum	Ambient Temp	Actual Vacuum	Coefficient English	Coefficient Metric	% Variation From Average
08/01/17	12	mm Hg	mm Hg	min	V <sub>m0</sub>	V <sub>m0</sub>	V <sub>m0</sub>	V <sub>s0</sub>	t <sub>m0</sub>	t <sub>m0</sub>	t <sub>a0</sub>	V <sub>s0</sub>	t <sub>a0</sub>	K'	<0.5%	Q	
08/01/17	12	734	355.9	10	0.0	26.1846	26.2999	0.1154	0.1090	26.7	26.1	25.6	23.22743	590.0	2.5554E-04	0.3075	Lpm
08/01/17	12	734	355.9	10	0.0	26.2999	26.4452	0.1153	0.1091	26.1	26.1	25.6	23.22743	590.0	2.5563E-04	0.3076	10.86
08/01/17	12	734	355.9	10	0.0	26.4452	26.5305	0.1153	0.1091	26.1	26.1	25.6	23.22743	590.0	2.5569E-04	0.3075	10.86
08/01/17	17	734	355.9	10	0.0	26.5640	26.7297	0.1153	0.1058	26.1	26.1	25.6	21.8889	556.0	2.5560E-04	0.3075	10.86
08/01/17	17	734	355.9	10	0.0	26.7297	26.8855	0.1158	0.1059	26.1	26.1	25.6	21.8889	556.0	2.5561E-04	0.4421	0.01
08/01/17	17	734	355.9	10	0.0	26.8855	27.0613	0.1167	0.1056	26.1	26.7	25.6	21.8889	556.0	3.6766E-04	0.4424	0.08
08/01/17	19	734	355.9	10	0.0	27.0992	27.2850	0.1185	0.1754	26.7	26.7	25.6	21.8889	556.0	3.6707E-04	0.4416	-0.08
08/01/17	19	734	355.9	10	0.0	27.2850	27.4707	0.1185	0.1754	26.7	26.7	25.6	21.8889	556.0	3.6738E-04	0.4420	15.61
08/01/17	19	734	355.9	10	0.0	27.4707	27.6689	0.1186	0.1757	26.7	27.2	26.1	21.8889	556.0	3.6740E-04	0.4420	15.61
08/01/17	25	734	355.9	10	0.0	27.7420	27.9809	0.2389	0.2252	27.2	27.2	26.1	21.33774	542.0	4.1135E-04	0.4949	-0.07
08/01/17	25	734	355.9	10	0.0	27.9809	28.2199	0.2389	0.2251	27.2	27.8	25.6	21.33774	542.0	4.1140E-04	0.4950	-0.05
08/01/17	25	734	355.9	10	0.0	28.2199	28.4595	0.2396	0.2253	27.8	28.3	26.1	21.33774	542.0	4.1210E-04	0.4958	0.12
08/01/17	30	734	355.9	10	0.0	0.3143	0.6042	0.2859	0.2722	28.3	28.3	26.1	19.95984	507.0	4.1162E-04	0.4952	17.49
08/01/17	30	734	355.9	10	0.0	0.6042	0.8944	0.2902	0.2723	28.3	28.9	26.1	18.66068	474.0	6.3857E-04	0.7683	-0.09
08/01/17	30	734	355.9	10	0.0	0.8944	1.1855	0.2911	0.2728	28.9	28.9	26.1	18.66068	474.0	6.3879E-04	0.7686	-0.05
08/01/17	30	734	355.9	10	0.0	1.1855	1.4766	0.2911	0.2728	28.9	28.9	26.1	18.66068	474.0	6.4001E-04	0.7700	27.16
08/01/17	30	734	355.9	10	0.0	1.4766	1.7677	0.2911	0.2728	28.9	28.9	26.1	18.66068	474.0	6.3912E-04	0.7690	27.12

I certify that the above Orifice Set was calibrated in accordance with US EPA Methods, CFR 40 Part 60, Appendix A, Method 5, Section 16.2.

  
Approved By: \_\_\_\_\_

Date: 8/1/2017

For valid test results, the Actual Vacuum must be 25mbar greater than the Theoretical Critical Vacuum.  
The Critical Orifice Coefficient, K1 in Metric units, ( $m^3 \cdot K^{-1} \cdot (mmHg)^{-1} \cdot min$ )

R.F. DGM - OXO

**APEX INSTRUMENTS REFERENCE METER 2 Point Audit  
USING WET-TEST METER #11AE6  
Air Compliance Testing**

Calibration Meter Information					
WTM Model #	AL20				
WTM Serial #	11AE6				
WTM Gamma	0.9899				
Original 1EPT Gamma	0.9951				

Calibration Conditions					
Date	Time	12-Jan-17	1:30		
Barometric Pressure		29.85	in Hg		
Calibration Tech		EW			
DGM Serial Number		S-110-1512377			

Run Time	DGM Input Pressure ( $P_{in}$ ) in H <sub>2</sub> O	Volume Initial ( $V_{in}$ ) cubic feet	Volume Sample ( $V_m$ ) cubic feet	Calibration Meter		Outlet Temp ( $t_{out}$ ) °F	Water Pressure ( $t_w$ ) in H <sub>2</sub> O	Water Flow ( $V_w$ ) cubic feet	Initial ( $t_i$ ) °F	Final ( $t_f$ ) °F	Volume Sample ( $V_m$ ) cubic feet	Calibration Factor Current (Y)	Calibration Factor Previous (Y')	Dry Gas Meter Current (Y)	
				Outlet Temp ( $t_{out}$ ) °F	Volume Final ( $V_f$ ) cubic feet										
6.00	-3.9	435.192	441.194	6.002	73.4	73.4	672.645	678.575	5.930	70	70	2.2	0.9927	0.9985	
10.00	-2.2	441.194	446.788	5.594	73.4	73.4	678.575	684.115	5.540	70	70	1.8	0.9983	0.9977	must be less than 0.5%
													0.24%	must be less than 0.24%	

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, App A, Method 5, Paragraph 7.1.2.2, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

*Chris White*  
Signature

Date 1/12/17

PF-DGM-DOLO

**APEX INSTRUMENTS REFERENCE METER CALIBRATION  
USING WET-TEST METER #1AE6**

**15-POINT ENGLISH UNITS**

Calibration Meter Information			
WTM Model #	AL-20		
WTM Serial #	11AE6		
WTM Gamma	0.9999		

Calibration Conditions							
Date	Time	7-Feb-14	12:00				
Barometric Pressure		29.9	in Hg				
Calibration Technician		EW					
DGM Serial Number		S-120-1512377					

Run Time	Calibration Data								Results					
	Meter Elapsed (h)	Volume Initial ( $V_0$ ) cubic feet	Volume Final ( $V_f$ ) cubic feet	Outlet Temp Initial ( $T_0$ ) °F	Outlet Temp Final ( $T_f$ ) °F	Volume Final ( $V_{fa}$ ) cubic feet	Volume Initial ( $V_{fi}$ ) cubic feet	Sample Volume ( $V_s$ ) cubic feet	Calibration Meter Initial Final	Outlet Temp Initial ( $T_{oi}$ ) °F	Outlet Temp Final ( $T_{of}$ ) °F	Dry Gas Meter Calibration Factor Value (Y)	Dry Gas Meter Calibration Factor Value (Y)	Flowmeter Std & Port Variation (cm)
5	-5.0	206.288	212.428	6140	73.4	73.4	78.120	85.150	6.030	69	69	1.0025	0.0032	1.20
5	-5.0	212.428	218.584	6166	73.4	73.4	85.150	91.175	6.025	69	69	0.9974	-0.0019	1.20
5	-5.0	218.584	224.757	6163	73.4	75.2	91.175	97.190	6.015	69	69	0.9979	-0.0013	1.20
6	-3.8	243.237	249.265	6028	75.2	75.2	115.300	121.165	5.865	69	69	0.9925	0.0008	0.97
6	-3.8	249.265	255.316	6051	75.2	75.2	121.165	127.045	5.880	69	69	0.9923	-0.0004	0.98
6	-3.8	255.316	261.372	6056	75.2	75.2	127.045	132.930	5.885	69	69	0.9923	-0.0004	0.98
7	-2.9	261.372	267.016	5644	75.2	75.2	132.930	138.420	5.490	69	69	0.9911	-0.0013	0.78
7	-2.9	267.016	272.644	5628	75.2	75.2	138.420	143.900	5.480	69	69	0.9921	-0.0003	0.78
7	-2.9	272.644	278.281	5637	75.2	77.0	143.900	149.390	5.490	69	69	0.9940	0.0016	0.78
10	-2.2	278.281	283.943	5662	77.0	77.0	149.390	154.925	5.535	69	69	0.9977	0.0023	0.55
10	-2.2	283.943	289.608	5665	77.0	77.0	154.925	160.450	5.525	69	69	0.9953	0.0000	0.55
10	-2.2	289.608	295.281	5673	77.0	77.0	160.450	165.970	5.520	69	69	0.9930	-0.0023	0.55
15	-1.9	224.757	230.823	6166	75.2	75.2	97.190	103.240	6.050	69	69	0.9972	0.0012	0.40
15	-1.9	230.923	237.078	6155	75.2	75.2	103.240	109.270	6.030	69	69	0.9957	-0.0003	0.40
15	-1.8	237.078	243.237	6159	75.2	75.2	109.270	115.300	6.030	69	69	0.9951	-0.0009	0.40
												0.9980	Averages	0.40
												0.99851	Overall Average Y	0.99851

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +/- 0.02.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, Using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the Anemand Bar Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

*John G. Lefebvre*  
Signature

Date

2/12/14

**RE: Certification of Air Emission Testing Body (AETB) Conformance**

To Whom it May Concern:

This letter is to confirm that Emissions Measurement Company LLC ("EMCo") is an Air Emission Testing Body (AETB) operating in conformance with ASTM D7036-04, as required by 40 CFR Part 75, Appendix A §6.1.2. The table below lists the EPA Reference Methods for which each listed Project Manager is a Qualified Individual and other relevant information required by (as applicable) 40 CFR Part 75.59(a)(15), 40 CFR Part 75.59(b)(6) and 40 CFR Part 75.59(d)(4).

<b>Emissions Measurement Company (800) 984-9883 AETB Qualified Individual Information</b>					
QI Name	QI Email	Exam*	Exam Date	Exam Provider	Provider Email
<b>Andrew Bruning</b>	abruning@stacktest.us	SES Group 1	6/12/2014	SES	QSTIprogram@gmail.com
		SES Group 2	9/18/2015		
		SES Group 3	6/12/2015		
<b>Craig Kormylo</b>	ckormylo@stacktest.us	EPA Method 30B	1/16/2015*	Ohio-Lumex	andrew.mertz@ohiolumex.com
		SES Group 1	2/5/2016	SES	QSTIprogram@gmail.com
		SES Group 3	1/16/2015*	Ohio-Lumex	andrew.mertz@ohiolumex.com
<b>Matthew Parks</b>	mparks@stacktest.us	SES Group 1	2/5/2016	SES	QSTIprogram@gmail.com
		SES Group 2	9/18/2015		
		SES Group 3	2/5/2016		
<b>Scott Bouchard</b>	sbouchard@montrose-env.com	SES Group 1	4/7/2017	SES	QSTIprogram@gmail.com
		SES Group 3	8/11/2017		

\*The Source Evaluation Society (SES) Group 1 Exam includes EPA Reference Methods 1, 1A, 2, 2A, 2C, 2D, 2F, 2G, 2H, 3, 3B, 4, 5, 5A, 5B, 5D, 5E, 5F, 5I, 17, 19, 201A and 202. The SES Group 2 Exam includes EPA Reference Methods 1 , 2, 3, 4, 3B, 6, 6A, 6B, 7, 7C, 7D, 8, 11,13A, 13B, 15A, 16A, 19, 26, 26A and 202. The SES Group 3 Exam includes EPA Reference Methods 3A, 6C, 7E, 10, 10B, 20, 25A, 40 CFR Part 60 Performance Specifications 2 – 8, 15 and 40 CFR Part 75. Initial 30B training provided by Ohio-Lumex; refresher exam administered by EMCo once every five years.

Please feel free to contact me with any questions regarding the above.



Matthew Parks  
Technical Director